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Claims:

1. Method for the recording and reading of data on a recording medium (2), using a holographic recording medium with a holographic recording layer (33) having a thickness in the order of wavelength of the reading and recording light, the holographic recording medium being preferably an optical card (2), and holographic write/read apparatus (1) for the recording medium, wherein  
the recording of the information is in the form of data pages stored as Fourier holograms recorded in a recording, and

10 reflected transmission and polarisation holography with different write and read wavelengths is used,  
characterised in correcting the distortion during reading in the readout channel caused by the difference between the write and read wavelengths.

15 2. Method according to claim 1, wherein the wavelength distortion is corrected by optical and/or software means.

3. Method according to claim 1 or 2, wherein the holograms (61) are recorded as on-axis holograms.

20 4. Method according to any one of the claims 1 to 3, wherein the recording and reading is made with polarisation multiplexing and/or phase-code and/or rotational multiplexing.

25 5. Holographic recording medium, preferably an optical card (2), having a carrier substrate (31), a holographic recording layer (33) sensitive to a reading and/or recording light having a given wavelength, and a reflection layer (32) between the carrier substrate (31) and the recording layer (33), characterised in that the recording layer (33) is a polarisation sensitive polymer material, and the thickness of the

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recording layer (33) is 0.5-2 times the wavelength of the reading and/or recording light.

6. Holographic recording medium according to claim 5, wherein the reflection layer

5 (32) is a wavelength selective mirror reflecting on the read wavelength and transmitting or absorbing on the write wavelength.

7. Holographic recording medium according to claim 5 or 6, wherein the recording layer (33) is an azobenzene SCP layer.

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8. Holographic recording medium according to any one of the claims 5 to 7, wherein the recording layer (33) is covered by a protective layer (34).

9. Apparatus for the writing and reading of a holographic recording medium, preferably an optical card (2), having a recording medium holding and/or positioning mechanism (4), movable or fixed read and write optics (9),

the write optics comprising a polarised writing light source (20), polarising selector means (23) for separating and/or combining the reference beam and the object beam, object beam modulating means (25), polarisation wave plate (24,35), an objective lens (27,47) for imaging the object beam onto a recording layer, and further the read optics comprising a polarised reading light source (21), and a polarising selector (23') and/or spatial filtering means for separating and/or combining the reference beam and the image beam, a light detector (29) and an objective lens (28,47) for imaging the image beam onto a light detector (29),

20 25 characterised in that the wavelength of the reading light source (21) is different from the writing light source (20), and

the read optics comprise wavelength distortion correcting means for correcting the distortion of the reconstructed image caused by the difference in the wavelength of the reading and writing light.

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10. Apparatus according to claim 9, wherein the wavelength of the writing light source (20) is between 400-550 nm, and the wavelength of the reading light source (21) is between 600-700 nm.

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11. Apparatus according to claim 9 or 10, wherein the wavelength distortion correcting means of the read optics comprise an aspherical plastic objective lens (48).

10 12. Apparatus according to any one of the claims 9 to 11, wherein the object beam and the reference beam in the read optics and/or the write optics have a common optical axis, and the polarising selector means comprise a polarisation selective beam splitter (23) and/or the spatial filtering means comprise a beam stop (36) for separating the reflected reference beam (18') from the reflected object beam (17).

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13. Apparatus according to any one of the claims 9 to 12, wherein polarisation encoder means (26) are provided in the optical path of the reference beam (18).

14. Apparatus according to claim 13, wherein the polarisation encoder means are  
20 comprising a LCSLM.

15. Apparatus according to any one of the claims 11 to 14, wherein the read optics and the write optics have a common objective lens (47) for imaging the reference and object beams (18,16) onto a recording layer and for imaging the reflected object  
25 beams (17) onto the read detector (29).

16. Apparatus according to claim 15, wherein the common objective lens is an aspheric lens (48) for the correction of the wavelength distortion, the aspheric lens (48) having a central region (49) and an annular region (50) in its aperture, where

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the central region (49) of the aspheric lens is tuned to the wavelength of the writing light source (20) for focusing the write object beam (17) onto the recording layer (33), and at the same time tuned to the wavelength of the read light source (21) for imaging the read object beam (17) onto the detector (29), and further the annular region (50) of the lens (48) is tuned to the wavelength of the read light source (21) for imaging the reflected object beam (17) onto the detector.

17. Holographic data storage system with a holographic recording medium (2) and a read/write apparatus (3) for the holographic recording medium (2), particularly with

10 the recording medium according to claim 5 and for a read/write apparatus according to claim 9,

characterised in utilising reflected transmission and polarisation holograms with different read and write wavelength, together with distortion correction means (47) for correcting the distortion caused by the difference between the read and write

15 wavelength.

18. The system according to claim 17, wherein the data storage capacity is multiplied by polarisation and/or phase code and/or rotational multiplexing.

20 19. Method for coding of the recorded information on a holographic optical recording medium, preferably an optical card (2), where the information is recorded in the form several discrete holograms (61) and/or subholograms recorded in different physical and/or logical recording locations on the optical recording medium (2), the holograms (61) containing data sets, where the sequence of the data

25 sets together constitute the recorded information,

characterised in that the data sets are recorded in a random sequence of the recording locations.

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20. The method according to claim 19, wherein the information is recorded in multiplexed holograms (61), and the logical recording locations are identified by the multiplexing address.

5 21. The method according to claim 20, wherein the information is recorded by polarisation holography using phase-code multiplexing, where one hologram (61) contains several phase-coded multiplexed holograms, and the logical recording locations are identified by the phase code address.

10 22. The method according to any one of the claims 19 to 21, wherein the location of the first data set is stored, and the location of the following data sets are stored in the previous data sets.

15 23. The method according to any one of the claims 19 to 22, wherein the random sequence of the data sets are stored and encrypted and/or made inaccessible for unauthorised users.